EVI and its Use. Design of an Economic Vulnerability Index and its Use for International Development Policy

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Abstract

As an answer to a need expressed by the UN General Assembly an Economic Vulnerability Index (EVI) has been defined by the Committee for Development Policy. The present paper, which refers to this index, first examines how a structural economic vulnerability index can be designed, in particular for low income countries: it recalls the conceptual and empirical grounds of such an index, considers the structure of the present EVI, its sensitivity to methodological choices about averaging, as well as related possible improvements, and briefly compares levels and trends of EVI in various groups of countries, using a new data base of a "retrospective EVI".

In a second part the paper examines how EVI can be used for international development policy, underlining two main purposes. The first one, for which EVI has been initially designed at the UN, is the identification of the Least Developed Countries (LDCs), allowed to receive some preferential treatment in aid and trade matters: EVI is, with income per capita and human capital, one of the three complementary criteria a country needs to meet to be included into the list of LDCs and consequently cannot be considered alone to avoid a graduation from the list. A second use would be to retain EVI as a criterion for aid allocation between developing countries, besides other and traditional criteria: we argue that such an inclusion is legitimate both for effectiveness and equity reasons. These two purposes are presented as complementary.

Key words: *vulnerability, instability, shocks, exposure, resilience, structural handicap, growth, least developed countries, aid effectiveness, aid allocation.*

[1] This paper presented at the opening session of the UNU WIDER Conference on Fragile States-Fragile Groups**,** Helsinki, June 2007, relies on a research done by the author in collaboration of the UN DESA and leading to a forthcoming book on the Least Developed Countries (Guillaumont 2007a). Special acknowledgement is due for the tables to Martine Bouchut at CERDI and Charles Milenko at UN DESA.

Economic vulnerability of developing countries is not really a new issue. If we consider the development literature of forty years ago, the issue of instability, especially for primary exports and international prices, held a significant part in the analysis of the problems faced by developing countries. Recently the economic vulnerability of developing countries has appeared to be high again on the international agenda.

Several trends and events may have contributed to explain this renewed interest on macro vulnerability in the last decade. The unsustainability of growth episodes in Africa has become a major intellectual and political challenge. In particular the problem of conflicts, acute in Africa, has drawn the attention of the international community on the risk of civil wars, often durable or recurrent: it is mainly in reference to these situations and other possible sources of collapse that new concepts have emerged, such as "LICUS" (low income countries under stress) or “fragile states”, although these concepts significantly differ from the economic vunerability, as it will appear below. Moreover, in the second part of the nineties, the “Asian crisis” has underlined the vulnerability of some emerging countries, which before the crisis registered a high level of capital inflows with a weak financial structure: it led several authors to assess the risk of a financial crisis, which is a measure of vulnerability, but also differ from the vulnerability of low income countries considered below. To be also noted the concern about the instability of international commodity prices has become deeper due to their possibly higher impact on producers in a context of liberalized domestic agricultural markets: initiatives have been taken to make proposals on the ways by which commodity dependent economies can manage the risks they face in a market based approach. And more generally the attention brought to vulnerability at the household level, which has emerged from the huge amount of work on poverty, has also reinforced the interest on vulnerability at

the macro level, since vulnerability of households results to a large extent from macro vulnerability.

Two main factors have not only contributed to the growing concern about macro vulnerability, but also led to look for an index of vulnerability, comparable across countries and likely to be used for the design of international development policies. They correspond to an international concern about the structural features of specific groups of countries, expressed in various UN meetings and resolutions. Two groups of countries thus have been considered with regard to their vulnerability. The first one, and the only official one, is the group belonging to the category of the "Least Developed Countries" (LDCs), set up by the UN General Assembly in 1971. The second, a more informal one, is the group of "Small Island Developing States" (SIDS). For both groups the need has been expressed to assess the vulnerability of the belonging countries through an appropriate indicator.

First the small island developing states (SIDS) have repeatedly expressed a concern about their level of vulnerability, as evidenced in 1994 at the Barbados Conference on Sustainable Development of Small Island Developing States. Following this Conference which asked for « the development of vulnerability indices and other indicators that reflect the status of small island developing countries and integrate ecological fragility and economic vulnerability », the United Nations General Assembly, in 1996, requested the Secretary General to prepare a report on the vulnerability index and the Committee for Development Planning (CDP) to examine this index. In 1998, the UN Commission on Sustainable Development urged the CDP to present its conclusion and other UN bodies to accord priority to work on vulnerability of SIDS. In 1999 the Committee for Development Policy (new name of the CDP), after considering several available indicators proposed a new and relatively simple index (United Nations 1999), elaborated further at the following sessions of the CDP, as explained below. Ten years after the Barbados Conference, the Mauritius Conference (December 2004) reiterated the concern of the international community about the

vulnerability of small islands. Few days later, the tsunami evidenced the relevance of this concern.

Second, in accordance with the own suggestions of the CDP, the General Assembly requested this Committee to consider "the usefulness of the vulnerability index as a criterion for the designation of the Least Developed Countries" (LDCs). Since the origin of the category the LDCs have been designed as low income countries suffering from structural handicap to growth. Besides the level of their income per capita, the criteria used to capture structural handicaps were initially the literacy rate and the share of manufacturing in GDP. They have been replaced in 1991 by two composite indices, one referring to human status, the other to economic diversification. In 1999, as noted above, a new "economic vulnerability index" (EVI) was considered by the CDP to replace the index of diversification as one of the criteria to be used for the identification of LDCs, in addition to the other two criteria (the level of GDP per capita and an index of human capital). The CDP, in 2000 in its triennial review of the list of LDCs did implement the EVI index as an identification criterion. It did it again in 2003 and 2006, after revising the index, slightly in 2002, more deeply in 2005. This new vulnerability criterion, initial and revised, has been acknowledged by ECOSOC .

The economic vulnerability of a country can be defined by the risk for (poor) countries to see their development hampered by the shocks they face, natural or external. There are two main kinds of exogenous shocks, then two main sources of vulnerability: 1) environmental or "natural" shocks, namely natural disasters, such as earthquakes or volcanic eruptions, and the more frequent climatic shocks, such as typhoons and hurricanes, droughts, floods, etc. ; 2) external (trade and exchange related) shocks, such as slumps in external demand, world commodity prices instability (and correlated instability of terms of trade), international fluctuations of interest rates, etc. Other domestic shocks may also be generated by political instability, or more generally by unforeseen political changes. These shocks however are not considered here, as far as they seem less "exogenous".

Vulnerability can be seen as the result of three components: (a) the size and frequency of the exogenous *shocks*, either observed (ex post vulnerability) or anticipated (ex ante vulnerability); (b) the *exposure* to the shocks ; (c) the capacity to react to the shocks, or

"*resilience*"[2]. The resilience is more dependent on the current policy, more easily reversible, less structural. But there may also be a structural element in the resilience component of vulnerability.

A distinction thus can be made between *structural vulnerability*, which results from factors that are durably independent from the current political will of countries, and the *vulnerability deriving from policy*, which results from present choices. For instance, the vulnerability of the Asian countries in the mid nineties, after the 1997 crisis, is very different from the vulnerability of small economies which export raw materials or of small islands. It is less structural, more the result of policy, more transient. This feature is clearly evidenced when vulnerability is measured by the probability of a financial crisis, estimated mainly from financial and policy variables (see for instance Berg and Patillo, 1999, Goldstein et al. 2000). If a vulnerability index is to be used for selecting certain countries and providing them with a durable support by the international community, the vulnerability to be measured is the structural one, which essentially results from the size of the shocks that can arise and the exposure to such shocks.

It also follows that structural economic vulnerability should be clearly distinguished from *state fragility*. As evidenced in several papers presented azt the WIDER conference, fragile states, as were the LICUS, are defined with regard to policy indicators, essentially the CPIA (Country policy and Institutional Assessment) of the World Bank: they are (developing, sometimes only low income) countries with a (very) low policy score[3]. Of course many countries may meet both the criteria of structural vulnerability and state fragility, due to the likely influence of the former on the latter, but the two concepts rely on opposite grounds, structural versus policy factors, and cannot be used by the same way to design international policies, as we shall see below for aid policies (see below footnote 24).

[2] The concept of resilience is largely used in some works more specifically oriented towards the environmental or natural sources of vulnerability (cf. Kaly et al. 1998). A distinction close to the previous one can be found in Rodrik (1999) who, looking for the risk of social conflict in countries facing external shocks, considered separately the severity of the shocks, the depth of latent social conflict (likely to increase the impact of the shocks), and the quality of conflict management institutions.

[3] for instance belonging to the bottom two quintiles of the CPIA or with no CPIA for the Development Assistance Committee of the OECD.

Another distinction should finally be done for the purpose of this paper between economic vulnerability and *ecological fragility*. The United Nations initial concern about vulnerability included both economic vulnerability and ecological fragility. It rapidly became clear that the two notions should be analysed separately. For instance, losses in biodiversity reflect ecological fragility and are not necessarily major elements of economic vulnerability. The ad hoc expert group commissioned by the UN on vulnerability clearly recognized this difference (which was reaffirmed by the CDP), while also acknowledging that economic vulnerability could be induced by natural factors, let us say by the environment ("the relative susceptibility of economies to damage caused by natural disasters"). So environmentally induced economic vulnerability can be considered either as economic vulnerability or as ecological vulnerability [4].

It is clearly an index of structural economic vulnerability which has been designed by the CDP with the EVI and which is considered here: it relates to structural factors, beyond the present will of the country, not to policy factors, which also influence the global vulnerability, mainly through resilience. EVI has been designed to identify among low income countries those suffering the most from structural handicaps to growth.

It should be noted that, to be used for LDCs identification, EVI is measured for a larger set of countries than the LDCs group, not only other low income countries, but also middle income ones. Thus it is conceivable to use it for other purposes, where the measurement of this structural handicap would appear useful. We argue that it is noticeably the case in the search for relevant aid allocation criteria.

In the next sections of this paper we consider successively two issues:

- how can a structural economic vulnerability index be designed, in particular for low income countries? And it has been done by the CDP?
- how can such an economic vulnerability index be used for international development policy, and in particular for LDCs identification and for aid allocation?

[4] A comprehensive attempt to build an "environmental vulnerability index" was undertaken by SOPAC (South Pacific Applied Geoscience Commission), cf Kaly and alii, 1999. In May 1999, the CDP considered several available indicators (the Commonwealth Secretariat composite vulnerability index, the Caribbean Bank economic vulnerability index and the SOPAC environmental vulnerability index), before proposing to build a new and relatively simple index of economic vulnerability (United Nations, 1999). In 2000, assessing the implementation of the outcome of the Barbados Conference, the GA (A/55/185) presented its own review of the several attempts to build a vulnerability index "for small island developing states", a review to a large extent focused on environmental issues

1- Designing a structural economic vulnerability index, with particular reference to the UN CDP index

In this section we consider successively four issues:

- the conceptual and empirical basis of an EVI
- the structure of the present EVI
- the sensitivity to methodological choices
- some levels and trends, using for the latter a "retrospective EVI"

1.1. Conceptual and empirical basis

Let us very briefly summarize the reasons why economic vulnerability is detrimental to development (for a review, see Guillaumont 2006). We refer to a dynamic definition of vulnerability, the risk of economic growth to be markedly and durably reduced by shocks). Another dynamic definition, somewhat broader, is the likelihood of negative and durable effects of shocks on poverty reduction.

We examine the links between vulnerability and growth referring to the three main components of vulnerability identified above (shocks, exposure and resilience), then add some few words on the direct effects on poverty.

Shocks: the Negative Impact of Instability on Growth

There is no much debate about the negative impact of "one side" natural negative shocks such as earthquakes, typhoons or floods. The damage caused by these events is often huge, first by the number of deaths, second by the destruction of physical capital. The debate is rather about the measurement of the size of these losses. Many shocks are "two sided" (up and down and again…), in particular external ones. It is the very nature of instability to be a succession of booms and slumps (of export prices, external demand, rainfalls …). This is why to assess vulnerability on a long period it is appropriate to consider the impact of instability or volatility rather than the impact of separate shocks. The impact of these successive "up and down" is not neutral, resulting either from an asymmetry of *ex post* reaction to positive and

negative shocks or from the uncertainty generated by their previous succession. Thus, there are both *ex post* and *ex ante* effects of instability (as clearly underlined by Gunning 2004). Most measures used in cross section literature rather rely on *ex post* concepts.

Some empirical studies offer a test of the macro vulnerability, considering the *instability of growth* but not specifically and separately its main sources. For instance Ramey and Ramey (1995) they show a significant link between the instability of the rate of economic growth and the average rate of growth it self (exogeneity of the instability tested). But this instability can be due to structural factors and to policy factors as well, a reason why the volatility of growth cannot be an approximate indicator of *structural* vulnerability (cf. infra) . The same remark applies to the recent and systematic attempt to assess the link between output volatility and growth due to Hnathovska and Loayza (2004). Both studies do not assess the impact of structural vulnerability as such.

The effects of *export instability*, a main source of structural vulnerability in developing countries, have been discussed for many years in the literature using growth regressions. There seems to be now a consensus emerging from several studies to conclude that export instability (or in some studies terms of trade instability) has a negative effect on growth [5]. More significant effects are found when the studies test simultaneously the (positive) effect of export growth, and the (negative) effect of export instability and when the export instability (size of the shocks) is either weighted by the average export to GDP ratio during the period (Guillaumont 1994, Combes and Guillaumont 2002), a ratio which is ceteris paribus the higher the lower the population size, or is an instability of the export to GDP ratio itself (Dawe 1996): the exposure to the shocks is thus taken into account.

Export earnings instability is not the only kind of instability the effects of which have been tested. We have previously estimated the influence of several *primary instabilities*, mainly exogenous, on the rate of growth and argued that these instabilities, significantly higher in South of the Sahara Africa than in other developing countries, may have been a major factor of the slow rate of growth in Sub-Saharan Africa during the seventies and eighties, since here on average these instabilities appear to have been higher than in other

[5] See for instance Bleany and Greenaway 2001, Glezakos 1984, Gyimah-Brempong 1991, Fosu 1992, 2001 Guillaumont 1994, Lutz 1994, Dawe 1996, Guillaumont et al. 1999, Combes and Guillaumont, 2002, Mendoza 2000 and the review of the literature by Araujo Bonjean et al. 1999

developing countries (Guillaumont et al.1999). They are the instability of the terms of trade, weighted by the average export to GDP ratio, or that of the real value of exports, weighted in the same way, the instability of the agricultural value added (weighted by the average share of agricultural value added in GDP) and political instability. The first and the third instabilities appeared to have a significant effect on growth, but not that of the agricultural value added. However in another work both the instabilities of real value of exports and of agricultural value added, here unweighted, appear to be significant (Guillaumont and Chauvet 2001). Recently Miguel, Satyanath and Sergenti (2004) have evidenced the impact of rainfall variations on growth in African countries during 1981-1999 and followingly on the likelihood of the civil conflict.[6]

The effects of primary instabilities affect more the rate of change in factor productivity than the level of investment. They are channelled to growth through *intermediate economic instabilities* (Guillaumont et al. 1999), namely the instability of the rate of investment and that of the relative prices. These two intermediate instabilities have negative effects on growth and are related to policy, which by this way is weakened by structural vulnerability. First, the instability of the rate of investment is a factor, curiously neglected in the literature, of lower average capital productivity: as a result of the declining marginal productivity of investment, the gain in total output due to a high level of investment is less than the loss due to a low level of investment. This effect, illustrated during the boom periods by the projects oversized, under prepared and weakly productive, mainly concerns public investment..The second, intermediate instability, that of the relative prices, proxied by the instability of the real effective exchange rate (REER) also appear to have a strong negative effect on the rate of growth. It is assumed to blur the market signals and induce a misallocation of investment. This negative effect of the REER instability or volatility has also been evidenced in several papers (Aizenman and Marion 1999, Ghura and Grennes 1993, Serven 1997, Guillaumont et al. 1999).

Either due to the macro policy through REER instability or to the passing through to farmers of world agricultural prices fluctuations, the instability of the real producer prices is generally considered as a factor of a lower average agricultural output, noticeably by its effects on the adoption of new techniques, as does the weather risk (Newbery and Stiglitz

[6] Actually the aim of this paper is to test the impact of negative growth shocks on the like hood of civil conflict, and only use rainfall variations as an instrumental variable for economic growth.

1981, and United Nations 2001b for a review of studies on the impact of risk on agricultural productivity). At a macro level the effects of the real producer prices instability on the growth of agricultural production have also been significantly tested from a sample pooling several products in many countries (Guillaumont and Combes 1996, Boussard and Gérard 1996, and as to the effects of real border prices instability, Subervie 2006).

Thus it seems that external instability has negative effects through the instability of the rate of investment and that of the real exchange rate, either by its impact on public finance when retained at the government level or by its impact at the producer level when passed through to producers.

Instability is also channelled to growth through political instability. The primary instabilities, and the induced intermediate ones, are a factor of political instability and civil war, and through these events, also a significant factor of lower growth. The instability of exports, all the higher that exports are primary, exacerbates the frustration feelings. When the instability of exports, weighted by the openness rate is introduced in a conflict occurrence model à la Collier- Hoeffler (2004), not only the coefficient of determination significantly increases, but also the share of primary commodities in exports becomes unsignificant (Guillaumont et al. 2005). Other exogeneous shocks may have similar effects on the risk of conflict: Miguel, Satyanatah and Sergenti (2004), examining the impact of civil war on growth, instrument civil war by rainfall instability which then appears to be a significant factor of it.

An impact of shocks depending on exposure: major influence of country size.

The main structural factor of a greater exposure to exogenous shocks is of course the smallness of a country. Among several ways by which the size of a country can be measured, the most meaningful is the number of inhabitants. In some cases (possibly for natural shocks) the area smallness could be a more relevant measure of the exposure to the shocks. But to assess the main economic consequences of the size of a country, independently from its income per capita, the most usual measure is the number of its population.

The vulnerability issue meets the old and renewed debate on the consequences of the size of nations (see recent works of Alesina and Spolaore 2004 and Winters and Martins

2004). Of course country size has many consequences, all of them at first glance not related to vulnerability, in particular scale economies in many sectors of activity, industry as well as government (the unit costs of public administration are expected to be higher in smaller countries). However, when investigating the channels by which size matters for development, links with vulnerability more clearly appear. There are at least three main channels (or intermediate variables) through which small size influences the exposure components of vulnerability: trade intensity, government size and social cohesion.

Take first the exposure to external shocks, well reflected by the export to GDP ratio. The smaller the (population) size, the higher (ceteris paribus) the trade to GDP ratio is (and the more "dependent" the economy). Country size is the main structural factor determining the trade to GDP ratio, then the main determinant of the "natural openness" and the main factor to be neutralized if an index of "openness policy" is drawn from the observed ratios (Guillaumont 1989, 1994). It is clear that the impact of a given export shortfall is higher, the larger the share of export in GDP. For that reason the trade to GDP ratio, then the main determinant of the "natural openness" and the main factor to be neutralized if an index of "openness policy" is drawn from the observed ratios (Guillaumont 1989, 1994). It is clear that the impact of a given export shortfall is higher, the larger the share of export in GDP. For that reason the impact of export instability (and of export growth as well) is better estimated when the export instability variable (export growth as well) is multiplied by the export to GDP ratio, i.e. when it is a "weighted" instability[7].[8]

Moreover diseconomies of scale associated to smallness result in a stronger difficulty to diversify at low cost. As a consequence small low income countries face a higher risk than larger countries to implement inefficient or costly policies when they adopt protectionist measures; for the same reason a protectionist trend at the world level is likely to be more damaging for small countries. Alesina and Spolaore (2004) have tested such an effect in a cross-section growth regression through a multiplicative variable of the (log of) population and openness: the coefficient of this multiplicative variable is found significantly negative,

[7] While natural openness, mainly determined by smallness, increases the exposure to trade shocks and consequently their negative effect on growth, openness policy is not only a positive factor of growth, but also a factor of greater resilience (Guillaumont 1994, Combes and Guillaumont 2002).

[8] Let us add that with regard to natural shocks or disasters, as far as they generally concern some specific groups of the population, the larger the population, the smaller the aggregate exposure: in a large country, climatic shocks are likely to affect only a small part of the population.

while that of each of two variables added independently in the regression is significantly positive.

Another reason why smallness is thought to be a factor of lower growth is its assumed impact on the *size of government*. The assumption of a (negative) relationship between (population) size and the relative size of government activities has been successfully tested by Alesina and Spolaore (2004). An interpretation can be found in a previous work by Rodrik (1998) who argue that high trade to GDP ratio (itself related to the population size) leads to an extension of the role of state in order to provide more insurance to the citizens. Or this relationship can be linked to a stronger effect of public revenue instability on public consumption. If a large size of government activities is a source of higher costs, there may be again a source of vulnerability due to smallness, likely to lower growth.

A third channel by which the country (population) size may impact vulnerability and growth is through *social cohesion*. It could be an advantage of smallness to allow more social cohesion (less ethnic, linguistic or religion fragmentation): if social fragmentation is a negative factor of growth *and* if fragmentation increases with population size, smallness is an advantage not an handicap. To be noted fragmentation, as a handicap, is not unrelated to vulnerability: one reason why it is assumed to negatively impact growth is that this structural factor influences the exposure or the resilience to the shocks (Rodrik, 1999). The reality may be more complex, and several works evidence non-linear relationships where linear ones are assumed. In particular rather than social fragmentation social polarization may be a handicap (and a factor of vulnerability) (Arcand et al. 2002), and polarization does not increase with population size: it (at least beyond a low threshold) rather decreases with it[9]. Also for that reason smallness may appear to enhance and not lower vulnerability.[10]

Anyway it clearly appears from several cross-country regressions that when appropriate control variables are used the (log of) population size is a significant positive factor of growth (Alesina and Spolaore 2004, Bosworth and Collins, 2003, Guillaumont and Guillaumont 1988, Guillaumont and Chauvet 2001, Millner and Weyman-Jones 2003) and a

[9] Even the assumption of a negative correlation between population size and other linguistic fragmentation is debatable: when fragmentation is explained both by the population size and the surface, the coefficient of population size is significantly negative, while that of surface is (significantly) positive. Since the absolute value of the coefficients are similar, it means that fragmentation decreases with population density (internal work in process at CERDI).

[10] The greater social cohesion of small islands is also debated by Helleiner (1996).

negative factor of export instability (Easterly and Kraay 2000). That smallness lowers growth may be due either to higher vulnerability or to scale diseconomies or to their conjunction.

Besides smallness of population size, *other factors of exposure* to shocks are to be considered. They are related to the structure of the economy and to the location of the country, primary economies and remote countries being more exposed to external and natural shocks. The extent to which they are so are examined below, with the indicators of exposure. Here let us note that, as smallness, remoteness is a structural handicap not only because it is a factor of vulnerability[11]: even if transport costs have decreased, distance remains an important obstacle to trade (Brun et al.1999, 2005, Carrère and Schiff 2005).

More on poverty effects of structural vulnerability

Instability by lowering growth has deleterious consequences on the pace of poverty reduction. It also has direct social effects independently of its effects on growth. Two reasons make these direct effects likely. One is the feeling of frustration generated by a shortfall of income following a rapid expansion which creates new needs and exaggerated expectations, as illustrated above by the risk of civil war or of crime. The other reason is due to poverty traps, linked to the asymmetry of reactions of health, education, employment to income fluctuations. As far as instability lowers growth, it indeed slows down poverty reduction normally expected from growth, but also results in an anti-poor bias for a given average rate of growth.

First*, instability of income lowers child survival*. Probably the best single indicator of the evolution of the social situation in low income countries is the child mortality under five, as made available by the Demographic and Health Surveys and extended by the WHO. Child mortality is a very sensitive indicator, likely to reflect the strong asymmetric effect which can be expected from income instability: if a rise in mortality results from an income shortfall, it will not be compensated afterwards by equal income increase…. Also, due to the existence of a lower limit to child mortality, the best functional form, where the dependent variable is expressed as a logit (Grigoriou 2004), implies fofor the relevant range of mortality values an

[11] The relevance of remoteness for vulnerability has been underlined by Encontre (1999)

asymmetry in the up and down effects of income variations. Tested in GMM, with observations every five years from 1980 to 2000, the effect of previous income instability on child survival appears to be significantly negative (Guillaumont 2006, Guillaumont, Korachais and Subervie 2006).

Second*, instability of income slows down poverty reduction*. When we introduce the macro vulnerability concern in the burgeoning cross country research on the determinants of the level and evolution of poverty, made feasible by the extension of comparable set of data at the World Bank, it appears as a neglected factor. Main concern has been until now to assess the growth and inequality elasticities of poverty (good recent illustration in Adams 2004), but without similar concern for the effects of income instability on poverty reduction (S.Guillaumont Jeanneney and Kpodar 2004 however examined the effects of financial instability on poverty). A reasonable assumption however is that an instability of income pushes people in poverty traps (poor people contracting health handicaps, children leaving the school, workers staying out of the labour market,…), so that the poverty reaction to a rise of average income is less than its reaction to a fall (see for instance in the context of Latin America de Janvry and Sadoulet 2000). This effect is expected to lower the absolute level of the average growth elasticity of poverty, and/or to increase poverty independently of income growth and inequality change: the instability of income must then be introduced both additively and multiplicatively with income growth. Measuring poverty change through the log of the headcount index of poverty on a sample of ten year spells and controlling for the rate of growth of income per capita and initial level of poverty, we obtain significant coefficients for the impact of income instability on poverty. This effect correspond to an increase in inequality which is captured only partially by the change in the Gini coefficient (another control variable)[12].We must not forget that besides this direct impact growth volatility lowers the average rate of growth. Indeed and stability is good for growth, which "good for the poor", but also stability makes growth better for the poor. Stability of growth makes it pro-poor (Guillaumont 2006, Guillaumont and Korachais 2006).

[12] Consistently with the idea that instability increases inequality, as found by Breen and Garcia-Penalosa (2005).

1.2. Structure of the present EVI

The Economic Vulnerability Index (EVI), is the composite index which has been set up and applied by the CDP in 2000 as a criterion for LDCs identification, applied again in 2003, then in 2006 (United Nations 2000, 2003, 2006). Minor and major revisions respectively occurred before these two last triennial reviews of the list of LDCs (see United Nations 2005, and our recommendations presented in 2004a, 2004b, 2006). The present (revised) EVI is a composite index calculated from seven component indices, four of which are shock indices, and three other ones exposure indices. Using an arithmetic averaging, equal weight is given to the total of shock indices and to the total of exposure indices. In shock indices equal weight is given to natural and external shocks. In exposure indices equal weight is given to population size and to the total of other indices. Of course, there are several other ways, possibly more logical, by which these component indices can be weighted and averaged (Guillaumont 2006, 2007), but the way used for EVI by the CDP has been chosen for reasons of simplicity and transparency.

We are considering a composite index[13] rather than a single one such as the *growth volatility*, which has been used in many econometric works. The volatility or instability of the rate of growth of income (per capita) reflects ex post a macro economic instability which does depend on exogeneous shocks and structural factors of exposure, but also on policy factors, either as a reaction to the shocks or as autonomous policy shocks. There is a clear empirical evidence of the influence of policy factors on growth volatility (Easterly et al.2001, Combes et al. 2000) [14]. For that reason growth rate volatility cannot be considered as a good synthetic indicator of structural vulnerability. Moreover the negative impact of shocks on growth does not necessarily involve growth instability, if costly insurance or compensatory mechanisms are at work.

The components of the EVI have been retained so that they reflect the main channels through which structural vulnerability affects growth potential.

[13] There are in the literature several previous attempts to propose a composite indicator of economic vulnerability, in particular Briguglio (1995) ,Atkins et al (1998), Crowards (1999) reviewed elsewhere in United Nations 1999, Guillaumont 2007, for instance, but not corresponding to our concept of structural vulnerability.

[14] For instance, Easterly et al. 2001 have stressed the negative effect (up to a point) of financial depth and the positive effect of openness on volatility. More specifically, concerning the effects of openness, Combes et al. 2000 find first that structural vulnerability (depending on structural factors, including population size) makes growth more unstable, whereas outward looking policy makes it more stable. Bleaney and Fielding 2002 also examine the impact of the exchange rate regime on output volatility, beside that of exogenous factors such as the instability of the terms of trade.

Natural and trade shocks

Climatic and other natural shocks are a main source of vulnerability in many developing countries and cover a large variety of events: earthquakes, typhoons or hurricanes, floods, droughts, insects' invasions, etc. An indicator of the risk of natural catastrophes might be the frequency of such events, measured over a long period of time. But as evidenced by the recent Asian tsunami, the most severe and exceptional events do not correspond to any measurable probability. The potential negative impact of these very different events differs from one to the other, and even within one kind of event. Measuring the economic losses resulting from these events in all the developing countries concerned seems to be an impossible task. Taking the number of people affected, if it is known, seems to be a better approach, but people may be more or less severely affected. Indicators of the average proportion of the population affected by these events can be used, specific to the way by which the population is affected (killed, displaced …))[15]. The *percentage of population displaced due to natural disasters (homeless index)* has been retained as a component of EVI only from 2003, when comparable data appeared available.

Due to this problem of data and to the fact not all natural shocks (as for instance recurrent droughts in Sahelian countries) were registered as "disasters" another proxy had to be looked for. It was found in the *instability of agricultural production* measured with regard to its trend value. Whereas the trend of agricultural production may be supposed to mainly depend on the economic policy pursued and on permanent factors, the fluctuations around the trend may be supposed to reflect the occurrence and severity of natural shocks, because they are likely to affect agricultural production[16]. For these reasons this indicator was retained as a component of the EVI.

[15] The main source of the data is the Emergency Events Data base, compiled by the Center for Research on Epidemiology of Disaster (CRED) at the School of Public Health, Université Catholique de Louvain, data also given and supplemented in the IRC annual *World Disasters Report*. Relying on these data, a picture of natural disasters in each LDCs can be found in UNDP (2001). A previous use of such data for the measurement of vulnerability may be found in Atkins et al. 1998.

[16] We used this indicator in several previous works (cf. for instance Guillaumont P. and S. 1988, Guillaumont, Guillaumont Jeanneney and Brun 1999).

The previous two measures of natural shocks, which are not correlated, are only complementary proxies of the size of the natural shocks likely to affect growth prospects (likely to be aggregated by a single average in an index of natural shocks). They give a picture of the average size of *past* shocks which is only a proxy of the risk of similar future shocks. The risk of the most severe or exceptional natural shocks, such as the December 2004 Asian tsunami, cannot be captured *ex ante* by any index of likelihood of the shock. It can only be reflected *ex post* in the measures here presented, and more as a durable damage, i.e. a structural handicap, than as a risk. This difficulty leads to give more attention to exposure indices.

Another caveat is needed. Instability indices are related to a trend or to an average level. Trends, even if to some extent predictable, can also reflect a structural handicap (e.g. a declining rainfall level or a rising sea level). But they are not presently retained as a component of EVI.

An indicator of *trade shocks* is given by the instability of the real export proceeds around its trend. It has to be applied to the total exports of goods and services: shocks affect service exports as well good exports, and often service exports are a large part of total export receipts in small (developing) countries. Some private transfers, such as migrant remittances, could also be included. It is assumed that for small countries this instability is structural, resulting from exogenous events, namely fluctuations in world prices, in external demand and in domestic events (for instance climatic shocks) not related to policy. Of course, some fluctuations of the export volume with regard to its trend may be due to the instability of the policy itself, but it can be supposed that policy influences more the trend than the fluctuations of the export volume.[17] However the trend in the terms of trade seems to a large extent out of control of the country: when it is deteriorating (as when the sea level is rising), it may be a

[17] The use of *instability indices* as components of a vulnerability indicator raisExposure to shock indicators are of particular ies measurement problems. Instability is always relative to a reference or trend value. It is measured, for instance, by the average absolute deviation rom the reference or the trend value, or more often, by the variance of this deviation. A critical issue is then the choice of this reference value, in particular the estimation of the trend. A deterministic trend has long been assumed (for instance, in the literature on export instability) , what was often inappropriate due to the possibility of non stationarity of the series. Since on the other hand the series may not be purely stochastic, the reference value can be conveniently estimated from a «mixed» function, combining a deterministic element and a stochastic element: this is the way by which instabilities of exports and of agricultural production have been estimated in the EVI used by CDP and that we retain in the next simulations. Several other measures are used in the empirical literature on matters of our concern. For instance, measurements of growth volatility generally use the standard deviation of the rate of growth (which may not be appropriate, when the rate of growth is not stationary). Other works on volatility use empirical filters such as the Hodrick-Prescott filter, from which a series is shared into a "cycle" and a "trend" components. We have compared the instabilities with regard to a trend measu red as done for the CDP from a mixed trend over 12 years and to an Hodrick-Prescott trend: correlations obtained between the two series of instability are very high (either level or rank correlations) (CERDI calculations)

handicap, without being an (unexpected) shock. And often terms of trade trends are reversible (what the trend in sea level is probably not).

Equal weight is given to the trade shock index and to the natural shock index when they are averaged in a shock index.

Exposure to shocks indicators

Exposure indices are of particular importance for two reasons. One is of course that the impact of shocks is the stronger the more exposed the countries are. The other one is that shocks indicators rely on the frequency of past events, taken as a probability of similar future events, but do not reflect the risk of being affected by future exceptional events, which depends of the exposure and thus can be captured through exposure indices. Four indicators are used for the measurement of the exposition to shocks.

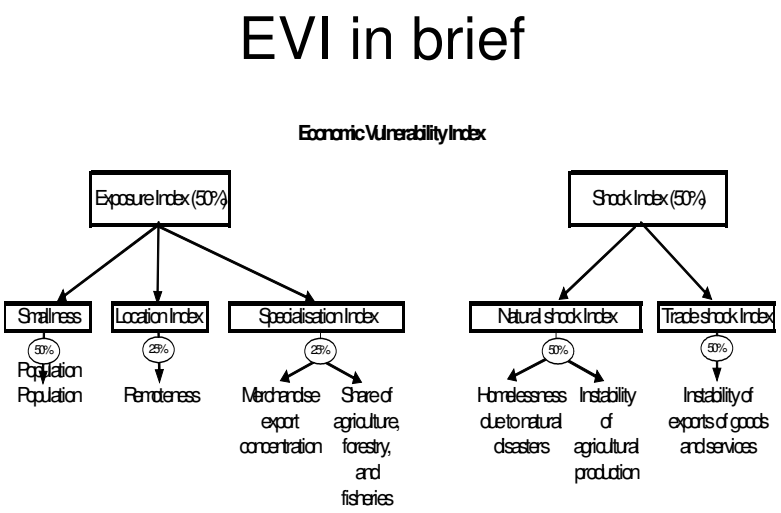
1) The first one to have been retained is an index of the population size (in logs), considering that small size is a handicap, due to vulnerability and other factors, as explained above.

2) The export concentration coefficient, as calculated for a long time by UNCTAD, and often used in academic literature, has also been retained since the first definition of the EVI, although limited to the exports of goods (not including services).

3) The share of agriculture, forestry, fisheries has been considered since 2003, instead of the (complement to 100 of the) share of manufacturing and modern services, as better reflecting the exposure to trade and natural shocks.

4) An index of remoteness from world markets (adjusted for landlockness) has been designed and calculated at CERDI and used by the CDP for the measurement of EVI. It measures the minimum (weighted) average distance for a country to reach a significant part (50%°) of the world market. With regard to each of these indicators, the situation the LDCs appear on average more vulnerable than other developing countries.

EVI in brief



1.3. Methodological choices to aggregate the components: weighting and averaging issues

The component indicators of EVI have been weighted and arithmetically averaged in a simple and transparent, although somewhat arbitrary way. We here examine whether alternative methods could be considered.

Arbitrary or revealed weights: vulnerability measured as an expected loss of growth?

The simplest and most transparent way to aggregate is, after measuring each component on the same scale depending on maximum and minimum values, to calculate an unweighted average of these components (as commonly done for some popular indices such as the HDI). There is indeed an apparent arbitrariness in this weighting since the actual weight is given by the number of components, then results from the choice of the components themselves. It has appeared reasonable to give equal weight to the shock components and to exposure

components so that the vulnerability index is an average of a shock index (SH) and an exposure index (EXP), as well to give equal weight to trade shocks (TS) and natural shocks (NS). As to the exposure index, since the main factor of exposure is the (small) size of the population (SP), it has been given a half weight, the other half (RS) being shared between the location component (remoteness) and the economic structure or specialization component (share of agriculture and export concentration).

To avoid the arbitrariness of equal weighting, some measures of vulnerability weigh the components by their estimated impact on the rate of growth or its instability. For instance Guillaumont and Chauvet 2001,2004 have used a set of component indicators to build a composite indicator of vulnerability, with the weights not chosen a priori, but drawn from an econometric regression so that they reflect the estimated impact on economic growth of the different components indicators (which is consistent with the definition of vulnerability as a handicap to growth). The resulting vulnerability indicator can be seen as the *ceteris paribus* impact on economic growth of the exogenous shocks and exposure variables. It is the estimated loss of growth due to structural vulnerability.[18] However it has to be recognized that this method of measurement of structural vulnerability, dependent on the quality of the regressions, seems more appropriate for academic use than for international policy. Moreover specific problems arise to aggregate vulnerability indicators, which must be addressed in any case.

[18] Another example of an econometric weighting is given by the Commonwealth Secretariat index of vulnerability (Atkins and Mazzi 1998, Easter 1999). It is an estimated value of instability of the rate of growth, with three explanatory variables empirically chosen among a lot (more than fifty), which reflect policy factors as well as structural factors. One main problem with this indicator is that it measures vulnerability with regard to growth volatility, which,as noted above, is not a good synthetic indicator of structural vulnerability since it depends on policy factors as well as structural ones. An alternative method would be to consider a "natural growth volatility" estimated from a regression including only structural factors, not depending on policy, as the components of EVI are supposed to be. But such a measure would not be preferable to the estimation of the impact on growth of the structural vulnerability components: structural vulnerability has been designed with reference to growth, and would be better measured by a loss of growth than by an excess volatility.

Reflecting the interaction between shocks and exposure. Let us consider the index of economic vulnerability as relying on the four following elements: a shock index composed by a trade shock index and of a natural shock index, and an exposure index composed by a (low) size index and a "location and structure index". Several averaging methods may be used to combine shocks and exposure indices. In the (traditional) arithmetic averaging of the (four) indices each index being taken independently from the other. If we want to take into account the fact that structural vulnerability depends on the interaction of shocks and exposure, we may consider other methods of averaging.

One method would be a *"semi-geometric" averaging*. It combines a geometric averaging the two composite shock and exposure indices and an arithmetic averaging the respective components of these shock and exposure indices: the exogenous shocks indices, because these shocks are substitute, are arithmetically averaged in an index of the shocks, and an index of the exposure to the shocks is similarly measured as an arithmetic average of the corresponding components, but the two respective indices of shocks and of exposure to the shocks are geometrically averaged, because shocks and exposure have multiplicative effects. Shocks make a country all the more vulnerable that it is more exposed. Exposure makes a country all the more vulnerable that the shocks are more important. But this metod should be specified with regard to another consideration or principle.

Reflecting the increasing marginal impact of vulnerability components. Rather to calculate the geometric average of the shock and exposure indices (EXP and SK) as

$$\mathrm{EVI} = \sqrt{\mathrm{EXP} \cdot \mathrm{SK}},$$

it would be preferable to consider that the higher impact is to be given to that of the two shock and exposure indices which is the higher and to calculate:

$$EVI = 1 - \sqrt{(1 - EXP)(1 - SK)}$$

The EVI is then drawn from a multiplicative index of low vulnerability. The relevance of this measurement can be illustrated by tsunami: as far as the likelihood of shocks is not easy to assess, it is all the more important to consider very exposed countries as vulnerable, even if the past frequency of the shocks has been low.[19]

Another kind of averaging, an intermediate, but convenient one, is to take an arithmetic average of the indices of log values of each the two shock and the two exposure indices after transforming them in indices of low vulnerability. It allows one to capture the various interactions between these elements in the determination of vulnerability (each component being first measured as a low vulnerability indicator, transformed in log, then taken as one less the index of this log value, so that to reflect a likely increasing marginal impact of factors of vulnerability). This arithmetic average of complements to one of the log indices of the main vulnerability components can be written (with l':index of the log of):

EVI(al) = ¼ [(1-I'P)+(1- I'(1-RS)+(1-l'(1-NS)+(1-l'(1-TS))]

The resulting EVI is decomposable into each of the four indices (and their sub grouping in shocks and exposure indices).

Sensitivity of results. Of course major changes in the level of EVI can be expected from the changes in the choice of components and the weight given to each of them. Significant differences can be observed between the EVI measured in 2006 and that would

[19] It would indeed be conceivable to weigh the respective shock indicators by corresponding exposure indicators. In other words, each indicator of the size of the shocks could be weighted by an indicator of the exposure assumed to correspond to the shocks, and the aggregate index of vulnerability could be decomposed in vulnerability sub-indices related to each kind of shock. But there is no simple correspondence between shock and exposure indicators, for instance small size economies appear to be more exposed to natural shocks, not only to trade shocks (Maldives). Thus it seems easier and more relevant to weigh the average shock index by the average exposure index.

have been obtained with the composition and weights of the EVI used in 2003 (average of the absolute difference of ranks among 65 LDCs and other LICS nearly equal to 7). It is an expected result of the improvements brought in the meanwhile.

More interesting is to look at the consequences of averaging methods. Table 2 gives a simulation of EVI 2006 with several ways of averaging, comparisons being made through differences of ranks among a set of 65 LDCs and other LICs, and the average of the absolute values of these differences. A larger difference from the arithmetic average used in 2006 is obtained with arithmetic average of log indices than with semi-geometric average. It is so because trade and natural shocks, separated in the former, but not in the latter (where they are gathered by a simple arithmetic average) are uncorrelated. The higher the number of components, the larger the difference.

1.4. Comparing synthetic indices; levels and trends

We briefly compare the synthetic indices from two data sets. One is the official data set of the 2006 review of the list of LDCs by the CDP. The other one is the tentative data set of a "retrospective EVI", calculated by CERDI/FERDI in collaboration with DESA over a thirty year period beginning in 1970 and according to the 2006 EVI definition[20]: it shows no decrease on average in LDCs, but a decrease elsewhere. Two more detailed tables respectively related to levels and trends by groups of countries are given at the end of the paper (Tables 3 and 4).

Averages from the 2006 review of LDC list

	Shock Index	*Exposure Index*	*EVI*
• SIDS	45	67	56

[20] This data set will be available soon from DESA website

• LDCs	52	55	53
• Other LICs	37	37	37
• All LICs	47	44	46
• All MICs	37	47	43
• Landlocked	44	51	47

Averages from a retrospective data base

	EVI			*Shock index*	*Exposure index*
	1970-79	1980-89	1990-99	1990-99	
• SIDS	59	56	54	44	64
• Non SIDS	43	40	40	39	40
• LDCs	53	52	51	49	54
• Non LDCs	43	39	38	35	41

Results do not differ significantly between the two sets of data and allow one to draw a few observations about levels and trends:

- EVI is higher in LDCs as well as in SIDS compared to other developing countries;
- The gap between LDCs and non LDCs is increasing while the gap between SIDS and non SIDS is decreasing;
- EVI is still higher in SIDS than in LDCs, but it is less and less so
- while the exposure index is significantly higher in SIDS than in LDCs, the shock index is higher in LDCs;
- the narrowing of the gap between LDCs and SIDS is entirely due to the shock index, the gap between the average exposure indices having not changed (see annex table);
- the slightly higher level of EVI in low income countries compared to middle income ones is due to a quite higher shock index, while exposure index is lower.

In brief and on average EVI not only is higher in LDCs than in any other group of countries (except SIDS), but also does not appear to have declined as in other groups (including SIDS).

2. Using EVI for international development policy

We here consider two main policy implications of the availability of the EVI. The more direct one is related to the identification of the LDCs, for which the index has been built, the other one, both more indirect and general, to the use of EVI as an instrument in the design of aid policies.

4.1. EVI as a criterion for LDCs identification: the graduation issue[21]

As noted in the introduction, EVI is one of the three criteria used by the CDP for the identification of the LDCs, the other two being the GNI per capita and the Human Assets Index (HAI), a composite index of health and education indicators. To be included into the list a country must meet the three criteria, considered as complementary: to be low income, with a low level of human capital, and highly vulnerable, what is assessed thanks to the three criteria. This complementarity in the three criteria is consistent with the assumption of a joint effect of vulnerability and human capital on growth. The LDCs are the LICs suffering the most from structural handicaps and are supposed to be those evidencing *both* a low HAI and a high EVI (three criteria complementary for inclusion). It means that a high EVI is used to identify a risk of a poverty trap when associated with low HAI. The use of EVI has led to few new inclusions since 2000. Only Senegal became in 2000 included due to the use of EVI, and Papua New Guinea eligible in 2006, its inclusion pending on its acceptance.

The possibility of a graduation from the list, and related rules were introduced only in 1991. These rules have been cautiously designed, to avoid premature graduations, and an instability in the list resulting from countries again eligible for inclusion after graduation….Margins have been imposed between inclusion and graduation thresholds of the criteria. Eligibility for graduation has to be found at two successive triennial reviews. And, more important, to be eligible for graduation an LDC must cease to meet not only one, but two of the three criteria which are to be met for inclusion. Briefly stated, implementation of the criteria is asymmetric for inclusion and graduation.

[21] These issues are more deeply examined in Guillaumont (2007a)

Since 1991 only one country has been graduated (Botswana in 1994). The graduation of two other countries has been decided in 2004 by the UN General Assembly (Cape Verde and Maldives), to be implemented later. Another one has been recommended in 2006 by the CDP for graduation (Samoa). Moreover, still in 2006, three other countries have been found eligible for a first time by the CDP (Kiribati, Tuvalu and Vanuatu), an eligibility which has to be reconsidered at the 2009 review, and should be confirmed before any recommendation.

It has to be noted that all the above present LDCs likely to be graduated are SIDS. Their spontaneous reaction was to resist against the CDP recommendation. Resistance was particularly active from Maldives, as it is now from Samoa. The main argument opposed to graduation is that these countries are highly vulnerable, as evidenced by the level of their EVI. Pushing ahead this argument some countries likely to be graduated have requested that an LDC could not be graduated unless it is no longer found (highly) vulnerable, so that (low) EVI would become a « compulsory » criterion.

If it was the case the "asymmetry" between inclusion and graduation criteria would become even deeper, since while meeting three criteria are needed for inclusion, graduation, instead to be proposed when only one criterion is no longer met (symmetry) or when two criteria are no longer met (present asymmetry), would be possible only when all the three criteria would be no longer met. Such a solution would make any graduation very unlikely, even for SIDS becoming upper middle income countries, and would lead to a quite inequitable treatment between developing countries. If some developing countries have been able to achieve sustainabily a significant rate of growth, and high levels of human capital as well, it means that they are not locked in a poverty trap, as LDCs are roughly supposed to be. And their high level of human capital, reflected in that they meet the corresponding (HAI) graduation criterion, is probably the reason of it.

However their vulnerability remains a matter of concern, for all the reasons listed above. This why a smooth transition strategy for graduating countries has been proposed by the CDP, then designed and officially adopted by the General Assembly. This is also an argument to consider, through EVI, the economic vulnerability as a relevant parameter of aid policies.

4.2. EVI as a criterion for aid allocation

Back to some results about aid effectiveness

Structural vulnerability, sometimes captured only by (exogeneous) export instability, although a negative factor of growth, has been found to increase the marginal aid effectiveness (the marginal contribution of aid to growth) and to do so more significantly than the quality of institutions and policy, so strongly put forward by Burnside and Dollar (2000) and the World Bank (1998): in other words aid dampens the negative effects of vulnerability on growth (Guillaumont and Chauvet 2001, Chauvet and Guillaumont 2003, 2007). These results from growth regressions are supported by micro-macro analysis of the determinants of the rate of success of World Bank projects (Guillaumont and Laajaj 2006). It follows that aid is potentially more effective in vulnerable countries such as SIDS and LDC. To be noted, either pro-cyclical or contra-cyclical, aid may have a stabilising impact with regard to exports, which we measure by the difference between the export instability and the aid plus export instability. This stabilising impact is a significant factor of growth, enlightening our previous results (Chauvet and Guillaumont 2007). Moreover, through its stabilising impact aid has a double effect on poverty reduction. First it enhances growth, which is a major factor of poverty reduction. Second, making growth more stable, as noted above it also makes it more pro-poor (Guillaumont 2006). These findings, briefly recalled, have implications for aid policies, and EVI may be helpful to draw such implications.

Structural vulnerability included among the criteria for aid allocation[22]

The easier way by which it is possible to take into account the economic vulnerability in the design of aid policies is to consider it as a relevant criterion of aid selectivity. Usual criteria of aid selectivity are the level of poverty (income per capita) and the quality of governance (the CPIA at the World Bank or any other index, such as ICRG or the Kaufman and Kraay index) (see for instance Collier and Dollar 2001, 2002, World Bank 2004, 2005). They do not include vulnerability, what could easily be done with EVI.

[22] More details can be found in Amprou, Guillaumont and Guillaumont Jeanneney (2007) and in Guillaumont and Guillaumont Jeanneney (2006)

There are at least two reasons to do it. First, as just seen above, aid effectiveness is increased by structural vulnerability: allocated according to vulnerability (among other criteria) aid will be more effective. It is an argument as well empirically grounded than the similar argument used to retain governance as a criterion. Second there is a reason of justice or equity: if we admit that a goal of aid is to compensate for structural handicaps to growth in order to promote an equality of opportunities/chances, it is again legitimate to retain structural vulnerability as a criterion for aid allocation.

Finally a practical matter has to be kept in mind. Retaining vulnerability, possibly EVI, as an ex ante aid allocation criterion would lead to an immediate dampening of unforeseen shocks, what is less easy to do with the schemes (nevertheless useful) trying to trigger *aid as an insurance.* We have extendly discussed these views in other papers (Guillaumont 2006, Guillaumont et al 2007, Guillaumont and Guillaumont Jeanneney 2003, see also Collier et al. 1999, Sarris 2003, Gilbert and Tabova 2005). The challenge is to quickly compensate for negative shocks, while promoting good governance and avoiding moral hazard[23]. Here again, for the implementation of such schemes, priority could be given to developing countries recognised as highly vulnerable with regard to EVI. In any case an effective implementation is more difficult than the inclusion of EVI among the aid allocation criteria.

Such an inclusion would lead to significant changes in aid allocation, benefiting to more vulnerable countries, LDCs, and SIDS as well. And it would change radically the assessment of the aid selectivity of donors, as we have recently evidenced elsewhere (Amprou, Guillaumont and Guillaumont Jeanneney 2007, see table 4 drawn from this paper): we have compared the rank of donors, bilateral as well as multilateral, for their aid selectivity, measured either from the aid elasticities to the indicators corresponding to the agreed criteria, as done by Dollar and Levin, or by what we have called the average profile of receivers, the profile being the average of the level of these indicators, weighted by the share of aid allocated to each of them. Summary results are given below.

[23] The answer is to offer automatic compensation when management rules (in particular in case of positive shocks) are ex ante agreed and implemented; It could be obtained through a regulation of debt service (+/-) according to the evolution of the terms of trade, or through a special fund for little indebted countries. Links between the micro and macro variables have to be checked, to make the insurance scheme effective not only at the macrolevel, but also for the groups more severely affected by the shocks, such as small farmers.

Summary impact of changing the measurement of aid selectivity:

average absolute value of rank differences for 42 donors (multilateral & bilateral)

and for only 22 bilateral donors, 2003

	All 43 donors	Bilateral only
between Dollar-Levin (2004) indices and other elasticity based estimates, inlcuding :		
Income pc and other governance index (KKI)	8.7	3.8
Income pc and vulnerability (EVI)	13.5	7.63
Income pc and MDGs (HAI)	11.8	6.09
All the five criteria ("global model")	12.8	7.27
between an index based on global allocation model estimates and recipient average profile index	7.25	3.63

Source: Amprou , Guillaumont and Guillaumont Jeanneney (2007)

Structural vulnerability versus state fragility in aid allocation: EVI versus CPIA

The concern about fragile states, enlightened by this conference, may enhance our argument presenting structural vulnerability (possibly measured by EVI) as a relevant criterion for aid allocation and help to solve the following paradox: on one hand according to the traditional paradigm aid is not effective in countries with poor policies and institutions (generally measured by CPIA), on the other hand there is a growing feeling that some aid has to be provided to fragile states (still often identified by CPIA) to avoid they become even more fragile. The so called "orphean sates" are the children of the traditional paradigm...[24] It is not surprising that the results of regressions on aid effectiveness in fragile states are uncertain or complex (see Chauvet and Collier 2005, McGillivray and Feeny, 2007). Structural vulnerability, as we argue, makes aid more effective, but also is a factor of state fragility, which, when measured by a policy indicator such as CPIA, is expected to make aid less effective. Actually in a previous paper (Chauvet and Guillaumont 2004) we found that,

[24] Indeed, for the year 2005 and 57 IDA eligible countries for which CPIA data are available, the level of CPIA appears significantly and negatively correlated to that of EVI (as measured for the 2006 review), once controlled for the level of income per capita.

while aid effectiveness is increased by structural vulnerability, it is decreased by political instability (a form of state fragility), and it also decreases with the quality of the previous policy (suggesting a possible improvement from a low level or fragile state when aid is appropriately delivered). When state fragility results from structural vulnerability, aid dampens its negative effect. When it does not, it is likely to have the opposite effect.

Anyway there is a need to investigate the relationships between structural vulnerability and state fragility, as well as their implications for aid allocation. It could be argued that structural vulnerability (through EVI) should be a criterion for aid allocation, while state fragility, or any policy or institutional indicator, should be considered to determine the appropriate modalities of aid, and not only as (even less than) an aid allocation criterion (Guillaumont and Guillaumont Jeanneney 2006).

Conclusion: two uses of EVI, complementary

Structural economic vulnerability is a matter of concern, particularly for small states (SIDS) and Least Developed Countries (LDCs), although differently for each other. It can be conveniently captured by the Economic Vulnerability Index (EVI) designed at the UN by the Committee for Development Policy. This index is an instrument needed for international development policies in two complementary fields.

One is the identification of LDCs, which are the low income countries suffering the most from structural handicaps to growth. Economic vulnerability, as reflected by EVI, is one of the two main structural handicaps to be considered, not independently of the other one, a low level of human capital (as measured by HAI): to be included into the list of LDCs, countries, at the time they meet the vulnerability criterion, should have a low income per capita and a low level of human capital; consequently, while still vulnerable, a country having reached a per capita income level well above the low income threshold and a level of human capital relatively high is likely to be graduated from the list.

The second field where the use of EVI is needed is the geographical allocation of aid: for effectiveness and equity reasons, structural vulnerability (EVI) should be considered as one of the main relevant criteria of aid allocation; its use would favour vulnerable countries, LDCs and SIDS as well, and would possibly legitimate aid to some fragile states.

Two reasons may be given to underline the complementarity of these two uses of EVI. First, using EVI as an aid allocation criterion would both facilitate reaching the specific target of ODA to LDCs (0.15%) and lead to modulate aid among them. Second it would allow graduated, but still vulnerable, former LDCs (generally SIDS) to still benefit from some preference in aid allocation, while no longer LDCs.

Through these two uses, and possibly other ones (such as trade policy), EVI, possibly improved, may serve to take structural vulnerability into account effectively.

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Tables

Table 1 - EVI level for 65 Least Developed Countries (LDCs) and other low income countries, as calculated for the 2006 review of the list of LDCs, with the measure of each component

				(1)		(2)		(3)		(4)	(5) = 1/2 (3+4)						(6)			(7)	(8) = 0.5 (6+7)			(9)		(10)= 0.5((1)+ 0.5(2+5))	(11)= 0.5 (8+9)	0.5 (10+11)
		EVI, 2006 review	Population, 2005		Remoteness		Export concentration 2003 or latest year (Main source: UNCTAD)		shares of agriculture, etc. 2003 or 2004		Specialisation index	% homeless 1990-2004				Agricultural instability 1979-2004			Natural shock index	Export instability 1979-2004 Trade shock			exposure index	shock index	EVI
			values	Max-min	Indice	Max-min	values	Max-min	values	Max-min		values		logs	Max-min	values	Max-min			values	Max-min					
LI	L	Afghanistan	29 863 010	18,59	0,766	83,30	0,318 a	25,65	38,0	63,33	44,49	0,51		-0,67	60,83	15,36	74,91		67,87	32,10	90,95		41,24	79,41	60,33
LI	L	Angola	15 941 390	28,24	0,679	72,36	0,911	95,42	15,5	25,78	60,60	0,21		-1,58	51,11	4,68	17,16		34,14	17,37	44,91		47,36	39,52	43,44
LI	L	Bangladesh	141 822 300	0,00	0,587	60,82	0,298	23,32	19,8	33,05	28,19	2,88		1,06	79,22	3,47	10,67		44,95	7,38	13,68		22,25	29,31	25,78
LI	L	Benin	8 438 853	38,02	0,579	59,84	0,456	41,92	35,0	58,35	50,13	0,91		-0,09	66,99	6,48	26,92		46,95	24,71	67,83		46,50	57,39	51,95
LI	L	Bhutan	2 162 546	58,96	0,768	83,50	0,415	37,01	33,2	55,38	46,20	0,06		-2,89	37,16	6,32	26,05		31,60	12,95	31,09		61,91	31,35	46,63
LI	L	Burkina Faso	13 227 840	31,11	0,736	79,54	0,602	59,06	33,8	56,37	57,71	0,12		-2,09	45,73	7,76	33,86		39,80	18,10	47,20		49,87	43,50	46,68
LI	L	Burundi	7 547 515	39,74	0,864	95,54	0,650	64,67	49,0	81,67	73,17	0,42		-0,87	58,64	5,64	22,37		40,51	26,97	74,91		62,05	57,71	59,88
LI	L	Cambodia	14 071 010	30,16	0,636	67,03	0,405 a	35,87	34,0	56,71	46,29	2,39		0,87	77,23	8,01	35,19		56,21	24,20	66,24		43,41	61,22	52,32
LI		Cameroon	16 321 860	27,88	0,598	62,31	0,448	40,99	23,1	38,47	39,73	0,02		-3,74	28,14	3,53	10,97		19,55	13,84	33,86		39,45	26,71	33,08
	L	Cape Verde	506 807	81,28	0,580	59,96	0,482	44,98	6,2	10,33	27,65	1,19		0,17	69,79	15,96	78,16		73,97	13,44	32,62		62,54	53,30	57,92
LI	L	Central African Republic	4 037 747	49,36	0,802	87,71	0,491	45,94	59,3	98,91	72,43	1,55		0,44	72,59	3,89	12,91		42,75	12,92	31,01		64,71	36,88	50,80
LI	L	Chad	9 748 931	35,80	0,671	71,33	0,630 a	62,37	29,9	49,84	56,11	1,16		0,14	69,48	7,81	34,11		51,80	40,32	100,00		49,76	75,90	62,83
LI	L	Comoros	797 902	74,30	0,727	78,36	0,881	91,88	40,9	68,11	80,00	0,08		-2,55	40,76	2,87	7,39		24,08	27,59	76,84		76,74	50,46	63,60
LI		Congo,Rep of	3 998 904	49,51	0,658	69,81	0,853	88,61	6,3	10,46	49,53	1,60		0,47	72,97	2,32	4,45		38,71	19,17	50,52		54,59	44,61	49,60
LI		Côte d'Ivoire	18 153 870	26,24	0,603	62,91	0,389	33,99	25,9	43,17	38,58	0,114 c		-2,17	44,87	4,28	15,04		29,95	11,68	27,13		38,49	28,54	33,52
LI		Dem. Peo's Rep.Korea	22 487 660	22,95	0,602	62,74	0,251 a	17,77	29,9	49,87	33,82	4,35		1,47	83,58	8,15	35,94		59,76	12,53	29,77		35,61	44,77	40,19
LI	L	Dem. Rep. of the Congo	57 548 740	8,50	0,658	69,77	0,555 a	53,58	51,9	86,57	70,08	0,35		-1,04	56,89	3,72	12,00		34,44	21,44	57,62		39,21	46,03	42,62
	L	Djibouti	793 078	74,39	0,618	64,75	0,584	56,91	3,1	5,15	31,03	3,33		1,20	80,73	8,81	39,52		60,12	21,64	58,25		61,14	59,19	60,16
LI	L	Equatorial Guinea	503 519	81,38	0,602	62,74	0,888 a	92,67	34,7	57,90	75,29	2,156 d		0,77	76,11	6,78	28,52		52,31	28,64	80,13		75,20	66,22	70,71
LI	L	Eritrea	4 401 357	48,03	0,618	64,70	0,589	57,51	13,6	22,74	40,12	0,49		-0,72	60,27	18,76	93,29		76,78	28,19	78,72		50,22	77,75	63,99
LI	L	Ethiopia	77 430 700	3,93	0,618	64,70	0,411	36,62	43,0	71,63	54,13	0,20		-1,59	51,07	14,28	69,06		60,06	13,84	33,89		31,67	46,97	39,32
LI	L	Gambia	1 517 079	64,41	0,561	57,60	0,459	42,28	26,4	43,98	43,13	0,42		-0,87	58,68	18,42	91,47		75,08	13,51	32,85		57,39	53,96	55,68
LI		Ghana	22 112 810	23,21	0,597	62,17	0,390	34,08	36,1	60,19	47,14	1,30		0,27	70,77	7,66	33,30		52,04	14,56	36,12		38,93	44,08	41,50
LI	L	Guinea	9 402 098	36,36	0,587	60,85	0,547	52,55	21,6	36,06	44,31	0,302 d		-1,20	55,21	3,48	10,72		32,97	8,25	16,41		44,47	24,69	34,58
LI	L	Guinea-Bissau	1 586 344	63,73	0,572	58,99	0,877	91,40	67,8	100,00	95,70	0,10		-2,27	43,79	4,26	14,92		29,35	33,18	94,30		70,54	61,83	66,18
LI	L	Haiti	8 527 777	37,86	0,632	66,55	0,273	20,34	28,3	47,11	33,73	1,54		0,43	72,56	2,73	6,63		39,59	34,89	99,66		44,00	69,63	56,81
LI		India	1 103 371 000	0,00	0,559	57,42	0,130	3,55	22,2	37,01	20,28	0,51		-0,68	60,74	3,11	8,71		34,72	3,85	2,67		19,43	18,70	19,06
LI		Indonesia	222 781 500	0,00	0,749	81,16	0,125	2,91	16,0	26,71	14,81	0,42		-0,86	58,80	3,08	8,56		33,68	8,66	17,68		23,99	25,68	24,84
LI		Kenya	34 255 720	16,48	0,673	71,57	0,251	17,81	14,0	23,29	20,55	0,01		-4,49	20,11	5,42	21,21		20,66	7,40	13,75		31,27	17,20	24,24
	L	Kiribati	99 350	100,00	0,724	78,00	0,643	63,91	17,3	28,82	46,36	5,013 d		1,61	85,10	12,55	59,72		72,41	49,82	100,00		81,09	86,20	83,65
LI	L	Laos	5 924 145	43,46	0,808	88,47	0,312 a	24,96	48,1	80,09	52,52	20,34		3,01	100,00	8,16	35,99		67,99	18,84	49,52		56,98	58,76	57,87
LI	L	Lesotho	1 794 769	61,83	1,000	100,00	0,352	29,59	16,1	26,77	28,18	0,06		-2,83	37,78	7,56	32,76		35,27	16,09	40,92		62,96	38,09	50,53
LI	L	Liberia	3 283 267	52,54	0,604	63,03	0,634	62,86	75,8	100,00	81,43	0,08		-2,52	41,14	11,28	52,88		47,01	35,17	100,00		62,39	73,51	67,95
LI	L	Madagascar	18 605 920	25,86	0,735	79,32	0,483	45,07	26,2	43,63	44,35	3,78		1,33	82,10	2,25	4,03		43,06	14,36	35,50		43,85	39,28	41,57
LI	L	Malawi	12 883 940	31,51	0,931	100,00	0,605	59,46	33,6	56,07	57,76	0,49		-0,71	60,43	10,12	46,58		53,51	13,06	31,43		55,20	42,47	48,83
	L	Maldives	329 198	87,91	0,788	86,03	0,472	43,74	7,7	12,80	28,27	13,80		2,62	95,87	4,00	13,54		54,70	5,61	8,16		72,53	31,43	51,98
LI	L	Mali	13 518 420	30,78	0,747	80,86	0,822	84,99	36,3	60,57	72,78	0,14		-1,98	46,91	6,13	25,04		35,98	11,62	26,94		53,80	31,46	42,63
LI	L	Mauritania	3 068 742	53,58	0,511	51,43	0,509	48,09	19,9	33,17	40,63	1,83		0,60	74,35	3,40	10,27		42,31	9,51	20,33		49,80	31,32	40,56
LI		Mongolia	2 646 487	55,86	0,775	84,36	0,357	30,28	20,0	33,38	31,83	0,01		-5,09	13,78	8,06	35,46		24,62	18,45	48,29		56,98	36,46	46,72
LI	L	Mozambique	19 792 300	24,91	0,759	82,43	0,631 a	62,48	21,5	35,80	49,14	3,03		1,11	79,75	7,30	31,37		55,56	11,96	27,99		45,35	41,78	43,56
LI	L	Myanmar	50 519 490	10,50	0,598	62,21	0,358	30,40	58,3	97,24	63,82	0,31		-1,17	55,50	4,97	18,76		37,13	21,64	58,24		36,76	47,69	42,22
LI	L	Nepal	27 132 630	20,06	0,758	82,20	0,304	24,01	38,0	63,39	43,70	0,60		-0,51	62,49	3,95	13,26		37,87	12,23	28,84		41,50	33,35	37,43
LI		Nicaragua	5 486 685	44,64	0,692	73,95	0,220	14,14	17,8	29,70	21,92	0,43		-0,83	59,05	8,81	39,52		49,29	13,79	33,71		46,29	41,50	43,89
LI	L	Niger	13 956 980	30,28	0,722	77,69	0,548	52,72	38,4	64,06	58,39	0,89		-0,11	66,73	12,98	62,03		64,38	14,93	37,27		49,16	50,83	49,99
LI		Nigeria	131 529 700	0,00	0,579	59,84	0,996	100,00	25,7	42,87	71,43	0,31		-1,18	55,36	3,73	12,08		33,72	28,50	79,68		32,82	56,70	44,76
LI		Pakistan	157 935 100	0,00	0,542	55,28	0,231	15,36	21,5	35,87	25,62	5,83		1,76	86,71	3,23	9,34		48,02	7,62	14,43		20,22	31,23	25,73
LI		Papua New Guinea	5 887 138	43,56	0,708	75,99	0,374	32,20	27,5	45,83	39,02	3,40		1,22	80,97	1,60	0,53		40,75	14,13	34,79		50,53	37,77	44,15
LI	L	Rwanda	9 037 690	36,97	0,849	93,69	0,395	34,75	41,3	68,84	51,79	0,11		-2,18	44,76	13,58	65,30		55,03	26,23	72,58		54,85	63,81	59,33
	L	Samoa	184 984	96,78	0,815	89,33	0,602	59,09	13,1	21,82	40,46	16,29		2,79	97,64	7,52	32,54		65,09	13,19	31,85		80,83	48,47	64,65
LI	L	Sao Tome and Principe	156 523	99,35	0,620	65,06	0,927	97,27	17,0	28,27	62,77	0,002 b		-6,38	0,00	7,03	29,87		14,94	20,41	54,40		81,63	34,67	58,15
LI	L	Senegal	11 658 170	33,05	0,561	57,58	0,290	22,32	15,1	25,17	23,75	0,57		-0,56	62,01	16,53	81,26		71,63	9,99	21,83		36,86	46,73	41,80
LI	L	Sierra Leone	5 525 478	44,54	0,594	61,72	0,857	89,07	47,9	79,78	84,42	0,253 d		-1,37	53,31	5,46	21,39		37,35	35,97	100,00		58,80	68,68	63,74
LI	L	Solomon Islands	477 742	82,18	0,764	82,94	0,437	39,65	44,9	74,86	57,26	0,32		-1,12	55,97	9,68	44,23		50,10	11,06	25,18		76,14	37,64	56,89
LI	L	Somalia	8 227 826	38,41	0,664	70,47	0,907	94,91	65,0	100,00	97,45	6,98		1,94	88,62	9,12	41,18		64,90	30,63	86,34		61,19	75,62	68,40
LI	L	Sudan	36 232 950	15,61	0,547	55,82	0,589	57,56	45,6	76,06	66,81	0,73		-0,31	64,59	8,42	37,39		50,99	25,88	71,49		38,46	61,24	49,85
LI	L	Tanzania, United Rep. of	38 328 810	14,75	0,699	74,93	0,347	29,07	41,3	68,86	48,97	0,19		-1,64	50,50	3,97	13,35		31,92	11,92	27,88		38,35	29,90	34,12
LI	L	Timor-Leste	947 064	71,66	0,469	46,08	0,259 a	18,70	30,5	50,80	34,75	0,109 d		-2,22	44,31	4,88	18,29		31,30	120,80	100,00		56,04	65,65	60,84
LI	L	Togo	6 145 004	42,90	0,592	61,52	0,318	25,64	40,8	67,98	46,81	1,58		0,46	72,83	5,47	21,45		47,14	15,49	39,03		48,53	43,08	45,81
	L	Tuvalu	10 441	100,00	0,764	82,94	0,978	100,00	18,9	31,44	65,72	5,52		1,71	86,12	21,10	100,00		93,06	42,69	100,00		87,17	96,53	91,85
LI	L	Uganda	28 816 230	19,14	0,853	94,13	0,288	22,13	30,9	51,44	36,79	0,17		-1,77	49,08	3,27	9,57		29,33	27,25	75,77		42,30	52,55	47,42
	L	Vanuatu, Republic of	211 367	94,73	0,764	82,94	0,404	35,75	21,4	35,62	35,69	5,16		1,64	85,40	8,81	39,49		62,44	15,96	40,51		77,02	51,48	64,25
LI		Viet Nam	84 238 230	2,64	0,605	63,17	0,239	16,32	20,1	33,48	24,90	1,52		0,42	72,42	2,12	3,37		37,90	21,69	58,40		23,34	48,15	35,74
LI	L	Yemen	20 974 660	24,02	0,563	57,91	0,896	93,62	14,2	23,73	58,68	1,25		0,23	70,34	5,21	20,07		45,20	16,09	40,90		41,16	43,05	42,11
LI	L	Zambia	11 668 460	33,04	0,939	100,00	0,504	47,58	20,8	34,72	41,15	0,11		-2,21	44,42	9,86	45,19		44,80	14,62	36,33		51,81	40,56	46,19

Table 2: Impact of averaging on the level of EVI, recalculated from the data of the 2006 review of the list of LDCs, regrouped in four categories of equal weight, 65 LDCS and other low income developing countries

			(1)		(2)		(3)		(4)					
			arithmetic		semi-geometric		arithmetic of logs		average of ranks		rank differences			
			values	ranks	values	ranks	values	ranks	values	ranks	1-2	1-3	1-4	2-3
LI	L	Afghanistan	60,33	52	65,22	54	41,21	46	50,67	51	-2	6	1	8
LI	L	Angola	43,44	22	43,58	21	28,45	23	22,00	21	1	-1	1	-2
LI	L	Bangladesh	25,78	5	25,87	4	13,85	4	4,33	5	1	1	0	0
LI	L	Benin	51,95	40	52,26	39	31,82	32	37,00	37	1	8	3	7
LI	L	Bhutan	46,63	29	48,86	33	33,93	37	33,00	33	-4	-8	-4	-4
LI	L	Burkina Faso	46,68	30	46,78	29	31,15	30	29,67	29	1	0	1	-1
LI	L	Burundi	59,88	50	59,93	48	46,79	53	50,33	50	2	-3	0	-5
LI	L	Cambodia	52,32	42	53,16	41	31,93	33	38,67	40	1	9	2	8
LI		Cameroon	33,08	6	33,38	6	20,34	7	6,33	6	0	-1	0	-1
	L	Cape Verde	57,92	47	58,17	45	42,43	48	46,67	46	2	-1	1	-3
LI	L	Central African Republic	50,80	39	52,81	40	40,90	45	41,33	41	-1	-6	-2	-5
LI	L	Chad	62,83	54	65,20	53	54,17	60	55,67	56	1	-6	-2	-7
LI	L	Comoros	63,60	55	66,05	56	49,66	55	55,33	55	-1	0	0	1
LI		Congo,Rep of	49,60	35	49,85	35	32,52	35	35,00	35	0	0	0	0
LI		Côte d'Ivoire	33,52	7	33,70	7	20,65	8	7,33	7	0	-1	0	-1
LI		Dem. Peo's Rep.Korea	40,19	13	40,37	13	24,62	14	13,33	13	0	-1	0	-1
LI	L	Dem. Rep. of the Congo	42,62	20	42,72	20	26,43	18	19,33	20	0	2	0	2
	L	Djibouti	60,16	51	60,17	49	40,25	41	47,00	47	2	10	4	8
LI	L	Equatorial Guinea	70,71	63	71,05	63	51,25	57	61,00	61	0	6	2	6
LI	L	Eritrea	63,99	57	66,72	59	43,57	49	55,00	54	-2	8	3	10
LI	L	Ethiopia	39,32	12	39,81	12	23,55	11	11,67	12	0	1	0	1
LI	L	Gambia	55,68	43	55,71	42	40,33	42	42,33	42	1	1	1	0
LI		Ghana	41,50	15	41,56	15	25,31	15	15,00	14	0	0	1	0
LI	L	Guinea	34,58	9	35,33	9	23,37	10	9,33	10	0	-1	-1	-1
LI	L	Guinea-Bissau	66,18	60	66,46	57	53,55	59	58,67	59	3	1	1	-2
LI	L	Haiti	56,81	44	58,76	46	46,63	52	47,33	48	-2	-8	-4	-6
LI		India	19,06	1	19,06	1	10,27	1	1,00	1	0	0	0	0
LI		Indonesia	24,84	3	24,84	3	13,22	2	2,67	2	0	1	1	1
LI		Kenya	24,24	2	24,56	2	14,89	5	3,00	3	0	-3	-1	-3
	L	Kiribati	83,65	64	83,85	64	74,95	64	64,00	64	0	0	0	0
LI	L	Laos	57,87	46	57,88	44	41,30	47	45,67	44	2	-1	2	-3
LI	L	Lesotho	50,53	38	52,11	38	35,71	39	38,33	39	0	-1	-1	-1
LI	L	Liberia	67,95	61	68,43	60	61,08	63	61,33	62	1	-2	-1	-3
LI	L	Madagascar	41,57	16	41,61	16	26,64	19	17,00	16	0	-3	0	-3
LI	L	Malawi	48,83	34	49,23	34	37,66	40	36,00	36	0	-6	-2	-6
	L	Maldives	51,98	41	56,60	43	40,85	44	42,67	43	-2	-3	-2	-1
LI	L	Mali	42,63	21	43,72	23	32,84	36	26,67	27	-2	-15	-6	-13
LI	L	Mauritania	40,56	14	41,29	14	27,61	20	16,00	15	0	-6	-1	-6
LI		Mongolia	46,72	31	47,71	31	31,39	31	31,00	31	0	0	0	0
LI	L	Mozambique	43,56	23	43,59	22	29,64	27	24,00	24	1	-4	-1	-5
LI	L	Myanmar	42,22	19	42,48	19	24,61	13	17,00	16	0	6	3	6
LI	L	Nepal	37,43	11	37,56	11	24,23	12	11,33	11	0	-1	0	-1
LI		Nicaragua	43,89	24	43,94	24	28,07	22	23,33	22	0	2	2	2
LI	L	Niger	49,99	37	50,00	36	34,74	38	37,00	37	1	-1	0	-2
LI		Nigeria	44,76	26	46,06	27	26,27	17	23,33	22	-1	9	4	10
LI		Pakistan	25,73	4	25,93	5	13,48	3	4,00	4	-1	1	0	2
LI		Papua New Guinea	44,15	25	44,52	25	29,17	24	24,67	25	0	1	0	1
LI	L	Rwanda	59,33	49	59,58	47	40,76	43	46,33	45	2	6	4	4
	L	Samoa	64,65	59	68,57	61	49,84	56	58,67	59	-2	3	0	5
LI	L	Sao Tome and Principe	58,15	48	65,36	55	43,81	50	51,00	52	-7	-2	-4	5
LI	L	Senegal	41,80	17	42,00	17	28,02	21	18,33	19	0	-4	-2	-4
LI	L	Sierra Leone	63,74	56	64,08	52	57,91	62	56,67	57	4	-6	-1	-10
LI	L	Solomon Islands	56,89	45	61,43	51	44,48	51	49,00	49	-6	-6	-4	0
LI	L	Somalia	68,40	62	69,24	62	54,27	61	61,67	63	0	1	-1	1
LI	L	Sudan	49,85	36	51,16	37	29,66	28	33,67	34	-1	8	2	9
LI	L	Tanzania, United Rep. of	34,12	8	34,26	8	21,60	9	8,33	8	0	-1	0	-1
LI	L	Timor-Leste	60,84	53	61,14	50	53,05	58	53,67	53	3	-5	0	-8
LI	L	Togo	45,81	27	45,88	26	29,42	25	26,00	26	1	2	1	1
	L	Tuvalu	91,85	65	93,33	65	93,29	65	65,00	65	0	0	0	0
LI	L	Uganda	47,42	32	47,67	30	29,45	26	29,33	28	2	6	4	4
	L	Vanuatu, Republic of	64,25	58	66,61	58	47,36	54	56,67	57	0	4	1	4
LI		Viet Nam	35,74	10	36,95	10	17,16	6	8,67	9	0	4	1	4
LI	L	Yemen	42,11	18	42,11	18	25,80	16	17,33	18	0	2	0	2
LI	L	Zambia	46,19	28	46,48	28	32,32	34	30,00	30	0	-6	-2	-6
LI		Zimbabwe	47,90	33	48,02	32	30,60	29	31,33	32	1	4	1	3
		Averages												
		50 LDC's	53,33	38,20	54,44	38,18	39,36	38,52	38,30	38,28	1,30	3,96	1,56	4,02
		15 other low income	36,99	15,67	37,36	15,73	22,53	14,60	15,33	15,07	0,20	1,87	0,73	1,93
		65	49,56	33,00	50,50	33,00	35,48	33,00	33,00	32,92	1,05	3,48	1,37	3,54
		Medians												
		50 LDC's	51,96	40,50	52,98	40,50	38,96	40,50	40,00	40,50	1,00	3,00	1,00	4,00
		15 other low income	40,19	13,00	40,37	13,00	24,62	14,00	13,33	13,00	0,00	1,00	0,00	1,00
		65	47,90	33,00	48,86	33,00	31,93	33,00	33,00	33,00	1,00	2,00	1,00	3,00

Table 3: Average and median values of EVI for broad groups and regions, from the 2006 review of the list of the LDCs

EVI, 2006 review	Population, 2005		Remoteness		Export concentration 2003 or latest year (Main source: UNCTAD)		shares of agriculture, etc. 2003 or 2004		Specialisation index	% homeless 1990-2004			Agricultural instability 1979-2004		Natural shock index	Export instability 1979-2004 trade shock index		exposure index	shock index	EVI
	values	Max-min	Indice	Max-min	values	Max-min	values	Max-min		values	logs	Max-min	values	Max-min		values	Max-min			
Least developed countries (50)																				
average	15 187 782	46,49	0,692	73,57	0,548	52,63	32,62	53,42	53,02	2,20	-0,48	62,86	8,08	35,45	49,16	22,69	54,37	54,89	51,76	53,33
median	8 333 340	38,22	0,675	71,84	0,507	47,84	33,44	55,73	49,64	0,54	-0,61	61,42	7,16	30,62	46,98	17,74	46,05	52,80	49,46	51,96
Low income EIT (8)																				
average	13 118 982	38,49	0,529	53,67	0,388	33,87	21,24	35,41	34,64	1,05	-1,63	50,59	7,86	34,37	42,48	15,52	39,12	41,32	40,80	41,06
median	5 885 387	43,65	0,641	67,59	0,395	34,68	19,80	33,00	38,24	0,88	-0,18	66,08	6,90	29,19	46,91	12,11	28,48	44,02	36,48	43,49
Other low income (15)																				
average	122 947 746	22,95	0,659	69,51	0,360	30,20	21,38	35,64	32,92	1,36	-0,94	57,98	5,18	19,90	38,94	14,16	34,87	37,08	36,90	36,99
median	22 112 810	23,21	0,605	63,17	0,251	17,81	21,52	35,87	31,83	0,51	-0,68	60,74	3,73	12,08	37,90	13,84	33,86	38,49	37,77	40,19
Least developed and other low income (65)																				
average	40 055 466	41,06	0,684	72,64	0,504	47,45	30,03	49,31	48,38	2,01	-0,58	61,73	7,41	31,86	46,80	20,72	49,87	50,78	48,33	49,56
median	9 402 098	36,36	0,664	70,47	0,459	42,28	27,50	45,83	46,29	0,51	-0,67	60,83	6,48	26,92	44,95	16,09	40,90	49,76	46,03	47,90
Developing countries excluding EIT (132)																				
average	39 078 767	44,82	0,657	69,16	0,441	40,10	19,27	31,75	35,93	1,48	-1,49	52,05	7,65	32,62	42,34	16,89	39,61	48,68	40,97	44,83
median	7 376 119	40,10	0,658	69,72	0,400	35,25	14,71	24,52	34,29	0,41	-0,88	58,58	6,53	27,20	41,37	13,48	32,74	47,91	38,04	43,13
Developing excluding EIT and LDC (82)																				
average	53 646 441	43,80	0,636	66,47	0,376	32,46	11,13	18,54	25,50	1,04	-2,11	45,46	7,39	30,90	38,18	13,35	30,61	44,89	34,39	39,64
median	6 802 758	41,34	0,649	68,60	0,314	25,14	9,20	15,34	22,12	0,34	-1,09	56,30	5,88	23,66	39,27	11,58	26,81	41,36	32,40	39,10
SIDS (33)																				
average	1 499 803	80,93	0,672	71,52	0,476	44,11	15,66	25,70	34,90	2,30	-1,26	54,58	8,56	37,99	46,28	20,45	44,27	67,07	45,28	56,17
median	329 198	87,91	0,651	68,89	0,425	38,18	10,37	17,28	33,73	0,41	-0,89	58,51	8,47	37,67	50,10	14,06	34,55	70,24	42,74	56,49
Landlocked developing (31)																				
average	12 201 110	39,61	0,764	80,97	0,455	41,73	27,78	46,30	44,01	1,15	-1,88	47,96	8,56	38,15	43,05	17,33	44,24	51,05	43,64	47,35
median	8 410 801	38,07	0,766	83,30	0,419	37,52	28,80	48,00	44,63	0,25	-1,40	53,02	7,76	33,86	43,69	14,93	37,27	52,33	40,56	46,68
EIT low income (8)																				
average	13 118 982	38,49	0,529	53,67	0,388	33,87	21,24	35,41	34,64	1,05	-1,63	50,59	7,86	34,37	42,48	15,52	39,12	41,32	40,80	41,06
median	5 885 387	43,65	0,641	67,59	0,395	34,68	19,80	33,00	38,24	0,88	-0,18	66,08	6,90	29,19	46,91	12,11	28,48	44,02	36,48	43,49
African LDC's (34)																				
average	13 415 629	42,58	0,688	72,89	0,589	57,51	34,27	55,72	56,62	1,00	-0,92	58,15	8,16	35,98	47,07	20,45	53,93	53,67	50,50	52,08
median	8 738 272	37,50	0,661	70,12	0,570	55,25	34,28	57,13	55,12	0,42	-0,87	58,66	7,16	30,62	45,88	17,74	46,05	51,01	48,72	50,26
Other African countries (18)																				
average	24 857 133	36,82	0,600	61,33	0,474	43,73	13,45	22,42	33,07	0,43	-2,55	40,77	7,26	31,15	35,96	13,95	34,21	42,01	35,09	38,55
median	14 665 695	29,62	0,619	64,88	0,419	37,54	11,27	18,78	32,53	0,12	-2,13	45,26	6,21	25,45	35,22	14,20	34,99	38,71	34,78	37,76
All African countries (52)																				
average	17 376 150	40,58	0,658	68,89	0,549	52,74	27,07	44,19	48,47	0,80	-1,49	52,13	7,85	34,31	43,22	18,20	47,10	49,63	45,16	47,40
median	9 575 515	36,08	0,646	68,31	0,528	50,32	24,40	40,67	46,97	0,30	-1,19	55,29	7,01	29,78	42,91	15,79	39,97	49,78	43,79	46,43

Table 4: A retrospective EVI from 1970, for main groups and regions, by decades and five year periods

		Decades			Five Years						
		70-79	80-89	90-99	70-74	75-79	80-84	85-89	90-94	95-99	2000-
Developing countries	Moy	5,55	5,19	4,69	5,17	5,57	5,52	4,49	4,45	4,15	3,49
	Nbo	*(75)*	*(86)*	*(105)*	*(77)*	*(80)*	*(88)*	*(100)*	*(107)*	*(111)*	*(114)*
	Sd	4,04	2,44	4,56	4,59	4,26	2,98	2,39	3,72	5,49	3,83
	Median	4,39	4,47	3,96	3,50	4,31	5,10	3,98	3,52	2,79	2,58
LDCs	Moy	5,61	5,62	6,03	5,31	6,55	6,24	4,95	5,03	5,83	3,93
	Nbo	*(24)*	*(26)*	*(40)*	*(24)*	*(26)*	*(27)*	*(35)*	*(41)*	*(44)*	*(45)*
	Sd	2,89	2,87	6,85	3,31	4,65	3,49	2,73	3,81	8,16	3,95
	Median	4,77	4,60	4,21	3,92	5,00	5,39	4,19	4,22	3,36	2,79
Non LDCs	Moy	5,52	5,01	3,87	5,10	5,09	5,20	4,24	4,10	3,05	3,20
	Nbo	*(51)*	*(60)*	*(65)*	*(53)*	*(54)*	*(61)*	*(65)*	*(66)*	*(67)*	*(69)*
	Sd	4,51	2,22	1,84	5,09	4,01	2,70	2,17	3,65	1,93	3,76
	Median	3,99	4,47	3,50	3,24	3,70	5,10	3,57	3,06	2,62	2,48
SIDs	Moy	6,22	5,98	4,22	6,09	7,11	6,72	4,50	4,15	3,38	3,14
	Nbo	*(11)*	*(18)*	*(25)*	*(11)*	*(13)*	*(19)*	*(25)*	*(25)*	*(26)*	*(27)*
	Sd	3,76	3,15	2,00	4,59	5,72	4,08	2,52	2,15	2,56	2,47
	Median	4,55	4,91	3,98	3,93	4,58	6,03	3,42	3,37	3,01	2,79
Non SIDs	Moy	5,43	4,99	4,83	5,01	5,27	5,19	4,48	4,55	4,39	3,60
	Nbo	*(64)*	*(68)*	*(80)*	*(66)*	*(67)*	*(69)*	*(75)*	*(82)*	*(85)*	*(87)*
	Sd	4,11	2,19	5,11	4,60	3,89	2,54	2,36	4,09	6,11	4,17
	Median	4,36	4,47	3,80	3,34	4,31	4,90	4,11	3,53	2,76	2,48
LDCs non SIDs	Moy	5,25	5,04	6,49	4,90	5,64	5,34	5,00	5,31	6,26	3,97
	Nbo	*(22)*	*(22)*	*(31)*	*(22)*	*(22)*	*(22)*	*(27)*	*(32)*	*(35)*	*(35)*
	Sd	2,13	2,12	7,63	2,36	3,07	2,31	2,65	4,11	8,96	4,07
	Median	4,77	4,41	4,25	3,92	4,72	4,87	4,19	4,23	3,29	2,88
LICs	Moy	5,74	5,27	5,65	4,98	5,75	5,72	4,42	4,62	5,54	3,72
	Nbo	*(36)*	*(37)*	*(49)*	*(36)*	*(37)*	*(37)*	*(44)*	*(50)*	*(53)*	*(53)*
	Sd	2,85	2,38	6,32	3,16	3,21	2,62	2,49	3,63	7,58	3,74
	Median	4,95	4,77	4,16	3,88	4,76	5,39	4,12	3,58	3,29	2,71
Non LICs	Moy	5,37	5,13	3,84	5,33	5,41	5,38	4,54	4,31	2,88	3,30
	Nbo	*(39)*	*(49)*	*(56)*	*(41)*	*(43)*	*(51)*	*(56)*	*(57)*	*(58)*	*(61)*
	Sd	4,93	2,50	1,71	5,58	5,02	3,24	2,33	3,83	1,53	3,93
	Median	3,45	4,43	3,56	3,24	3,69	5,10	3,85	3,10	2,66	2,51
SIDs non LDCs	Moy	5,47	5,16	4,10	5,26	5,13	5,47	4,36	4,22	2,97	2,75
	Nbo	*(9)*	*(14)*	*(16)*	*(9)*	*(9)*	*(14)*	*(17)*	*(16)*	*(17)*	*(17)*
	Sd	2,53	2,21	1,65	3,30	2,60	2,90	2,25	2,07	1,78	1,35
	Median	4,55	4,35	3,87	3,93	4,19	5,17	3,42	3,57	2,62	2,96
SIDs LDCS	Moy	9,60	8,82	4,43	9,84	11,57	10,21	4,79	4,03	4,16	3,81
	Nbo	*(2)*	*(4)*	*(9)*	*(2)*	*(4)*	*(5)*	*(8)*	*(9)*	*(9)*	*(10)*
	Sd	7,88	4,58	2,62	9,48	8,65	5,18	3,18	2,42	3,62	3,69
	Median	9,60	8,67	4,09	9,84	9,45	10,14	3,78	3,23	3,38	2,78
LDCs / Non LDCs	*Wilcoxonn-z*	-1,27	-0,96	-1,57	-1,61	-2,00	-1,27	-1,20	-1,42	-1,81	-0,85
	pvalue-z	0,203	0,335	0,116	0,108	0,046	0,205	0,229	0,157	0,071	0,396
LICs / Non LICs	*Wilcoxonn-z*	-2,07	-0,49	-1,36	-1,28	-1,78	-0,96	0,30	-0,28	-1,68	-0,41
	pvalue-z	0,038	0,622	0,174	0,202	0,076	0,337	0,765	0,779	0,093	0,685
	Wilcoxonn-z	-1,13	-1,11	-0,45	-1,10	-1,32	-1,25	0,21	-0,58	0,11	-0,10
SIDs / Non SIDs	pvalue-z	0,258	0,265	0,652	0,272	0,186	0,212	0,833	0,561	0,909	0,918
	Wilcoxonn-z	-0,38	-0,64	0,69	-0,29	-0,27	-0,78	0,92	0,50	0,89	0,43
SIDs / LDCs non SIDs	pvalue-z	0,703	0,523	0,489	0,775	0,785	0,433	0,360	0,618	0,374	0,665
	Wilcoxonn-z	0,94	1,70	0,17	0,47	1,54	2,04	0,00	-0,40	1,00	0,10
SIDs non LDCs / LDCs	pvalue-z	0,346	0,089	0,865	0,637	0,123	0,042	1,000	0,692	0,319	0,920
	Wilcoxonn-z	0,04	0,45	0,63	0,02	0,87	0,71	0,79	0,18	1,25	0,43
SIDs non LDCs/SIDs LDC	pvalue-z	0,968	0,650	0,526	0,984	0,385	0,475	0,429	0,859	0,213	0,664